Electronic Version
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Claims

[c1] What is claimed is:

1. Carried out in the manufacture of a fluid-dynamic-pressure bearing unit having a shaft section including at least a shaft, and a sleeve section including at least a sleeve and a thrust bush, wherein in between the shaft section and the sleeve section a continuous oil-retaining gap including a radial bearing and/or a thrust bearing is formed, the shaft section and the sleeve section are disposed to let one rotate relative to the other with the gap intervening, and in a portion of the bearing unit in contact with air that connects the oil-retaining gap with the atmosphere a taper-seal area is formed, a method of manufacturing fluid-dynamic-pressure bearings, comprising:

a first step of, with the fluid-dynamic-pressure bearing unit not yet filled with oil, reducing the pressure of the environment surrounding the bearing unit to a first pressure or lower and injecting a first volume of oil into the taper-seal area of the bearing unit;

a second step, carried out after termination of said first step, of keeping the environment surrounding the bearing unit at a pressure equal to, or pressurizing to a pres-

sure higher than, that of the bearing unit immediately prior to said second step, said second step being carried out one cycle, or a number of cycles more than that; and a pressure restoration step, carried out following termination of said second step, of restoring to atmospheric pressure the environment surrounding the bearing unit.

[c2] 2. Carried out in the manufacture of a fluid-dynamic-pressure bearing unit having a shaft section including at least a shaft, and a sleeve section including at least a sleeve and a thrust bush, wherein in between the shaft section and the sleeve section a continuous oil-retaining gap including a radial bearing and/or a thrust bearing is formed, the shaft section and the sleeve section are disposed to let one rotate relative to the other with the gap intervening, and in a portion of the bearing unit in contact with air that connects the oil-retaining gap with the atmosphere a taper-seal area is formed, a method of manufacturing fluid-dynamic-pressure bearings, comprising:

a third step of, with the fluid-dynamic-pressure bearing unit not yet filled with oil, reducing the pressure of the environment surrounding the bearing unit to a first pressure or lower and injecting a third volume of oil into the taper-seal area of the bearing unit;

a fourth step, carried out after termination of said third

step, of keeping the environment surrounding the bearing unit at a pressure equal to, or pressurizing to a pressure higher than, that of the bearing unit immediately prior to said fourth step, and of removing a fourth volume of oil from the taper-seal area; and
a pressure restoration step, carried out following termination of said fourth step, of restoring to atmospheric pressure the environment surrounding the bearing unit.

[c3] 3. A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 1, further comprising:
a fourth step, carried out after termination of said second step, of keeping the environment surrounding the bearing unit at a pressure equal to, or pressurizing to a pressure higher than, that of the bearing unit immediately prior to said fourth step, and of removing a fourth volume of oil from the taper-seal area; wherein
said pressure restoration step is carried out following termination of said fourth step.

[c4] 4. A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 1, wherein consecutive to any one cycle of said second step pressure reduction of the environment surrounding the bearing unit is carried out.

[c5] 5. A method of manufacturing fluid-dynamic-pressure

bearings as set forth in claim 1, wherein:
in advance of said first step the environment surrounding the bearing unit not yet filled with oil is reduced to said first pressure or lower;
the bearing-unit surrounding environment is maintained in that state for a predetermined time period; and
subsequently said first step is carried out.

[c6] 6. A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 2, wherein:
in advance of said third step the environment surrounding the bearing unit not yet filled with oil is reduced to said first pressure or lower;
the bearing-unit surrounding environment is maintained in that state for a predetermined time period; and
subsequently said third step is carried out.

[c7] 7. A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 5, wherein:
said first pressure is 100 Pa or less; and
said predetermined time is 10 seconds or more.

[c8] 8. A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 6, wherein:
said first pressure is 100 Pa or less; and
said predetermined time is 10 seconds or more.

[c9] 9. A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 1, wherein at least a portion of the sleeve is composed of an oil-impregnable porous substance.

[c10] 10. A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 2, wherein at least a portion of the sleeve is composed of an oil-impregnable porous substance.

[c11] 11. A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 5, wherein at least a portion of the sleeve is composed of an oil-impregnable porous substance.

[c12] 12. A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 6, wherein at least a portion of the sleeve is composed of an oil-impregnable porous substance.

[c13] 13. An apparatus for manufacturing a fluid-dynamic-pressure bearing unit configured so that its oil- and surrounding-air interface is positioned within its micro-gap, the bearing-unit manufacturing apparatus comprising:

a vacuum chamber;

an evacuating means equipped with evacuating power to

evacuate the interior of said vacuum chamber to less than 100 Pa, the evacuating power being adjustable;

a pressure gauge for indicating pressure within said vacuum chamber;

a gas-introducing mechanism enabled for introducing an adjustable volume of gas into the interior of said vacuum chamber, and for restoring said vacuum chamber interior to at least atmospheric pressure;

an oil-injection nozzle at least the nozzle-tip end of which is installed in said vacuum chamber interior;

an oil-supply mechanism for adjustably supplying a predetermined volume of oil to said oil-injection nozzle;

an oil-injection-nozzle positioning mechanism;

an oil-removal nozzle at least the nozzle-tip end of which is installed in said vacuum chamber interior;

an oil-aspirating mechanism for adjustably aspirating a volume of oil from said oil-removal nozzle;

an oil-removal-nozzle positioning mechanism;

a control mechanism for executing, in response to what the pressure that said vacuum gauge indicates is, control of evacuation operation by said evacuation means, gas-introducing operation by said gas-introducing mechanism, oil-supplying operation by said oil-supplying mechanism, and oil-aspirating operation by said oil-aspirating mechanism, at least in that operational sequence.

[c14] 14. A spindle motor utilizing, as a bearing mechanism for supporting its rotatory sections, a fluid-dynamic-pressure bearing unit manufactured by the method set forth in claim 1.

[c15] 15. A spindle motor utilizing, as a bearing mechanism for supporting its rotatory sections, a fluid-dynamic-pressure bearing unit manufactured by the method set forth in claim 2.

[c16] 16. A signal record-and-playback device, comprising:
a recording medium;
the spindle motor set forth in claim 14, for rotationally driving said recording medium;
a signal access means for recording signals onto and reading signals out from said recording medium; and
a positioning means for shifting said signal access means in a radial direction with respect to the rotational center of said recording medium.